

WHAT IS CLAIMED IS:

1. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

transforming an image signal of a coding target block to be subjected to coding into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on a field basis;

setting a processing order for coding the frequency components corresponding to the image signal of the coding target block, according as the image signal of the coding target block has been subjected to the frame-by-frame frequency transformation or the field-by-field frequency transformation; and

successively coding the frequency components corresponding to the image signal of the coding target block according to the order which has been set.

2. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of

163

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from the side of low-frequency components toward the side of high-frequency components is set so that the components arranged along a horizontal direction of a display screen and the components arranged along a vertical direction have uniform priorities; and

concerning an intra-coded block in which the frequency components obtained by the frequency transformation correspond to the image signal of the coding target block, the processing order from the side of low-frequency components toward the side of high-frequency components is adaptively set according to the kind of the intra-frame prediction process; and

in the second order setting operation, concerning both the inter-coded block and intra-coded block, the processing order from the side of low-frequency components toward the side of high-frequency components is set so that the components arranged along a vertical direction of a display screen have priority over the components arranged along a horizontal direction.

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27. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said method

comprising:

performing rearrangement to an input signal of a decoding target block to be subjected to decoding that is obtained by coding various frequency components which have been subjected to an inter-frame prediction process and an intra-frame prediction process in a prescribed order, with switching, on the basis of flag information indicating switching of rearrangement, which information is input together with the input signal, between the first rearrangement operation in which the input signal is subjected to adaptive rearrangement in an order according to the kinds of both the prediction processes, and the second rearrangement operation in which the input signal is subjected to rearrangement in a specific order, regardless of the kinds of both the prediction processes;

generating intra-frame predicted values of frequency components corresponding to the decoding target block from frequency components corresponding to an already decoded block located in the vicinity of the decoding target block, by the intra-frame prediction process;

generating frequency components corresponding to the decoding target block on the basis of the input signal after the rearrangement and the intra-frame predicted values;

performing inverse frequency transformation to

165

the frequency components corresponding to the decoding target block to generate one of an image signal corresponding to the decoding target block and a difference signal corresponding to the same block; and

adding, to the difference signal corresponding to the decoding target block, inter-frame predicted values of an image signal of the decoding target block, which are generated from an image signal corresponding to an already decoded display screen different from a display screen including the decoding target block by the inter-frame prediction process, thereby generating an image signal corresponding to the decoding target block.

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~~28~~. The image processing method as defined in claim ¹
~~27~~ wherein:

a coded interlaced image signal, which is obtained by coding an interlaced image signal block by block, is received as the coded image signal to be subjected to decoding;

in the first rearrangement operation,

concerning an inter-coded block in which frequency components obtained by frequency transformation of the interlaced image signal correspond to inter-frame difference values of a coding target block, the frequency components to which the processing order from the side of

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low-frequency components toward the side of high-frequency components has been uniformly set so that the components arranged along a horizontal direction of a display screen and the components arranged along a vertical direction have uniform priorities, are rearranged according to the processing order which has been uniformly set; and

concerning an intra-coded block in which frequency components obtained by frequency transformation of the interlaced image signal correspond to an image signal of a coding target block, the frequency components to which the processing order from the side of low-frequency components toward the side of high-frequency components has been adaptively set according to the kind of the intra-frame prediction process, are rearranged according to the processing order which has been adaptively set; and

in the second rearrangement operation, concerning both the inter-coded block and intra-coded block, the frequency components to which the processing order from the side of low-frequency components toward the side of high-frequency components has been set so that the components arranged along a vertical direction of a display screen have priority over the components arranged along a horizontal direction, are rearranged according to the processing order which has been set with a priority given

167

to a vertical direction.

29. An image processing apparatus for dividing an input digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said apparatus comprising:

a blocking unit for blocking the digital image signal correspondingly to the respective blocks, frame by frame or field by field, which is used as a processing unit of frequency transformation, and outputting the blocked image signal and frequency transformation type information indicating the processing unit of frequency transformation;

inter-frame prediction means for performing inter-frame prediction to the blocked image signal to output inter-frame prediction data corresponding to inter-frame difference values between the image signal of each block and inter-frame predicted values of the image signal, and outputting inter-frame prediction information concerning the generating process of the inter-frame predicted values;

intra-frame prediction means for generating intra-frame predicted values of inter-frame prediction data corresponding to a coding target block from inter-frame

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values; and

a fourth adder for adding the intra-frame predicted values to the difference values to output the result of the addition as quantized values corresponding to an already coded block.

4.
31. An image processing apparatus for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said apparatus comprising:

a variable-length decoding unit for performing variable-length decoding to a coded string that is obtained by performing inter-frame prediction, intra-frame prediction, frequency transformation, quantization, rearrangement, and variable-length coding to an image signal corresponding to each block;

inverse scanning means including plural inverse scanners having different orders of rearrangement, and each rearranging quantized values which have been rearranged in coding so that the order of the quantized values is returned to the order before the rearrangement, the inverse scanning means selecting an inverse scanner to be used for rearranging the quantized values, according to a scan

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changing signal which is generated outside/inside a system, and inter-frame prediction information indicating the kind of inter-frame prediction and intra-frame prediction information indicating the kind of intra-frame prediction in coding;

intra-frame prediction means for generating intra-frame predicted values of quantized values corresponding to a decoding target block from quantized values corresponding to an already decoded block located in the vicinity of the decoding target block, according to the intra-frame prediction information, and outputting the result of addition between the output of the inverse scanning means and the intra-frame predicted values;

• inter-frame prediction means for performing inter-frame prediction to the output of the intra-frame prediction means on the basis of the inter-frame prediction information, to generate an image signal corresponding to each block; and

an inverse blocking unit for inverse-blocking the image signals of the respective blocks according to frequency transformation type information indicating a processing unit of frequency transformation in coding, to output a digital image signal; and

said inverse scanning means being constructed so that switching is performed, on the basis of flag

information indicating switching of rearrangement, which information is input together with an input signal of the decoding target block that is obtained by coding various frequency components which have been subjected to the inter-frame prediction process and the intra-frame prediction process in a prescribed order, between the first rearrangement operation in which the input signal is subjected to adaptive rearrangement in an order according to the kinds of both the prediction processes, and the second rearrangement operation in which the input signal is subjected to rearrangement in a specific order, regardless of the kinds of both the prediction processes.

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32. The image processing apparatus as defined in claim ~~31~~ wherein said intra-frame prediction means comprises:

an intra-frame predictor for generating intra-frame predicted values of quantized values corresponding to a decoding target block from quantized values corresponding to an already decoded block located in the vicinity of the decoding target block, according to intra-frame prediction information; and

a first adder for adding the intra-frame predicted values to the output of the selected inverse scanner; and

171

said inter-frame prediction means comprises:

an inverse quantization unit for inverse-quantizing the output of the first adder to output frequency components of a difference signal corresponding to each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the frequency components to output a difference signal corresponding to each block;

a second adder for adding inter-frame predicted values of an image signal corresponding to each block to the difference signal to output an image signal corresponding to each block;

a frame memory for storing the output of the second adder, as an image signal of an already decoded block as a constituent of an already decoded display screen; and

an inter-frame predictor for generating the inter-frame predicted values on the basis of inter-frame prediction information and an image signal of an already coded block.

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33. ~~A data recording medium containing an image processing program, which makes a computer execute image processing in the image processing method defined in any of~~

blocks constituting a single display screen, said method comprising:

performing rearrangement to an input signal that is obtained by coding various frequency components in a prescribed order, in an order which is decided according as an image signal corresponding to a decoding target block to be subjected to decoding has been subjected to frame-by-frame frequency transformation on a frame basis or field-by-field frequency transformation on a field basis, thereby generating frequency components corresponding to the decoding target block; and

performing inverse frequency transformation to the frequency components corresponding to the decoding target block to regenerate an image signal corresponding to the decoding target block.

3. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

transforming an image signal of a coding target block to be subjected to coding into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on

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a field basis;

setting a processing order for coding the frequency components corresponding to the image signal of the coding target block, according to a combination pattern of the kind of frequency transformation to which the image signal of the coding target block has been subjected and the kind of frequency transformation to which an image signal of an already coded block located in the vicinity of the coding target block has been subjected; and

successively coding the frequency components corresponding to the image signal of the coding target block according to the order which has been set.

4. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said method comprising:

performing rearrangement to an input signal that is obtained by coding various frequency components in a prescribed order, in an order which is decided according to a combination pattern of frequency transformation to which an image signal corresponding to a decoding target block to be subjected to decoding has been subjected and frequency

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transformation to which an image signal corresponding to an already decoded block located in the vicinity of the decoding target block has been subjected, thereby generating frequency components corresponding to the decoding target block; and

performing inverse frequency transformation to the frequency components corresponding to the decoding target block to regenerate an image signal corresponding to the decoding target block.

5. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

transforming an image signal of a coding target block to be subjected to coding into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on a field basis;

generating predicted values of the frequency components corresponding to the coding target block from frequency components corresponding to an already coded block located in the vicinity of the coding target block, by a prescribed prediction process;

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setting a processing order for coding difference values between the frequency components of the coding target block and the predicted values, according to a combination pattern of the kind of frequency transformation to which the image signal of the coding target block has been subjected and the kind of the prediction process; and successively coding the difference values corresponding to the coding target block according to the order which has been set.

6. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said method comprising:

performing rearrangement to an input signal that is obtained by coding various frequency components which have been subjected to a prediction process in a prescribed order, in an order which is decided according to a combination pattern of the kind of frequency transformation to which an image signal corresponding to a decoding target block to be subjected to decoding has been subjected and the kind of the prediction process;

generating predicted values of frequency

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components corresponding to the decoding target block from frequency components corresponding to an already decoded block located in the vicinity of the decoding target block, on the basis of the kind of the prediction process;

generating frequency components corresponding to the decoding target block on the basis of the input signal after the rearrangement and the predicted values; and

performing inverse frequency transformation to the frequency components corresponding to the decoding target block to regenerate an image signal corresponding to the decoding target block.

7. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

transforming an image signal of a coding target block to be subjected to coding into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on a field basis;

generating predicted values of the frequency components corresponding to the coding target block from frequency components corresponding to an already coded

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block located in the vicinity of the coding target block,
by a prescribed prediction process;

setting a processing order for coding difference values between the frequency components of the coding target block and the predicted values, according to a combination pattern of the kind of frequency transformation to which the image signal of the coding target block has been subjected, the kind of frequency transformation to which an image signal of the already coded block located in the vicinity of the coding target block has been subjected, and the kind of the prediction process; and

successively coding the difference values corresponding to the coding target block according to the order which has been set.

8. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said method comprising:

performing rearrangement to an input signal that is obtained by coding various frequency components which have been subjected to a prediction process in a prescribed order, in an order which is decided according to a

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combination pattern of the kind of frequency transformation to which an image signal corresponding to a decoding target block to be subjected to decoding has been subjected, the kind of frequency transformation to which an image signal corresponding to an already decoded target block located in the vicinity of the decoding target block has been subjected, and the kind of the prediction process;

generating predicted values of frequency components corresponding to the decoding target block from frequency components corresponding to the already decoded block located in the vicinity of the decoding target block, on the basis of the kind of the prediction process;

generating frequency components corresponding to the decoding target block on the basis of the input signal after the rearrangement and the predicted values; and

performing inverse frequency transformation to the frequency components corresponding to the decoding target block to regenerate an image signal corresponding to the decoding target block.

9. An image processing apparatus for dividing an input digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said apparatus

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comprising:

a blocking unit for blocking the digital image signal correspondingly to the respective blocks, frame by frame or field by field, which is used as a processing unit of frequency transformation, and outputting the blocked image signal and frequency transformation type information indicating the processing unit of frequency transformation;

a frequency transformation unit for performing block-by-block frequency transformation to the blocked image signal to output frequency components corresponding to the image signal of each block;

a quantization unit for quantizing the frequency components to output quantized values corresponding to the image signal of each block;

plural scanners having different orders of rearrangement, and each setting a prescribed processing order to the quantized values by rearranging the quantized values;

a scan control unit for outputting a control signal for selecting a scanner to be used for rearranging the quantized values, according to the frequency transformation type information; and

a variable-length coding unit for performing variable-length coding to the quantized values after the rearrangement.

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10. An image processing apparatus for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation on a frame basis or on a field basis to a digital image signal, for each of blocks constituting a single display screen, said apparatus comprising:

a variable-length decoding unit for performing variable-length decoding to a coded string that is obtained by performing rearrangement and variable-length coding to quantized values of frequency components of an image signal corresponding to each block;

plural inverse scanners having different orders of rearrangement, and each rearranging quantized values which have been rearranged in coding so that the order of the quantized values is returned to the order before the rearrangement, thereby outputting the quantized values;

an inverse scan control unit for outputting a control signal for selecting an inverse scanner to be used for rearranging the quantized values, according to frequency transformation type information indicating whether frequency transformation in coding is performed on a frame basis or on a field basis;

an inverse quantization unit for inverse-quantizing the quantized values to output frequency

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components of an image signal corresponding to each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the frequency components to output an image signal corresponding to each block; and

an inverse blocking unit for inverse-blocking the image signals of the respective blocks according to the frequency transformation type information to output a digital image signal.

11. An image processing apparatus for dividing an input digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said apparatus comprising:

a blocking unit for blocking the digital image signal correspondingly to the respective blocks, frame by frame or field by field, which is used as a processing unit of frequency transformation, and outputting the blocked image signal and frequency transformation type information indicating the processing unit of frequency transformation;

a frequency transformation unit for performing block-by-block frequency transformation to the blocked image signal to output frequency components corresponding

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to the image signal of each block;

a quantization unit for quantizing the frequency components to output quantized values corresponding to the image signal of each block;

a predictor for generating predicted values of quantized values corresponding to a coding target block to be subjected to coding, from quantized values corresponding to an already coded block located in the vicinity of the coding target block, and outputting the predicted values and prediction information concerning the kind of the generating process of the predicted values;

a first adder for subtracting the predicted values from the quantized values corresponding to the coding target block to output difference values;

a second adder for adding the predicted values to the difference values to output the result of the addition as quantized values corresponding to an already coded block;

plural scanners having different orders of rearrangement, and each rearranging the difference values;

a scan control unit for outputting a control signal for selecting a scanner to be used for rearranging the difference values, according to the prediction information and the frequency transformation type information; and

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a variable-length coding unit for performing variable-length coding to the difference values after the rearrangement.

12. An image processing apparatus for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said apparatus comprising:

a variable-length decoding unit for performing variable-length decoding to a coded string that is obtained by performing prediction, rearrangement, and variable-length coding to quantized values of frequency components of an image signal corresponding to each block;

plural inverse scanners having different orders of rearrangement, and each rearranging quantized values which have been rearranged in coding so that the order of the quantized values is returned to the order before the rearrangement;

an inverse scan control unit for outputting a control signal for selecting an inverse scanner to be used for rearranging the quantized values, according to frequency transformation type information indicating the kind of frequency transformation in coding and prediction

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information indicating the kind of prediction in coding;

an inverse quantization unit for inverse-quantizing the quantized values to output frequency components of an image signal corresponding to each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the frequency components to output an image signal corresponding to each block; and

an inverse blocking unit for inverse-blocking the image signals of the respective blocks according to the frequency transformation type information to output a digital image signal.

13. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

transforming an image signal of a coding target block to be subjected to coding into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on a field basis;

setting a processing order for coding the frequency components corresponding to the image signal of

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the coding target block, according to a distribution of frequency components corresponding to an image signal of an already coded block; and

successively coding the frequency components corresponding to the image signal of the coding target block according to the order which has been set.

14. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said method comprising:

performing rearrangement to an input signal that is obtained by coding various frequency components in a prescribed order, in an order which is decided according to a distribution of frequency components of an image signal corresponding to an already decoded block, thereby generating frequency components corresponding to a decoding target block to be subjected to decoding; and

performing inverse frequency transformation to the frequency components corresponding to the decoding target block to regenerate an image signal corresponding to the decoding target block.

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15. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

transforming an image signal of a coding target block to be subjected to coding into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on a field basis;

generating predicted values of the frequency components corresponding to the coding target block from frequency components corresponding to an already coded block located in the vicinity of the coding target block, by a prescribed prediction process;

setting a processing order for coding difference values between the frequency components of the coding target block and the predicted values, with switching, on the basis of flag information indicating whether adaptive order setting is carried out or not, between the first order setting operation in which a processing order is adaptively set according to the kind of the prediction process, and the second order setting operation in which a specific processing order is set regardless of the kind of the prediction process; and

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successively coding the difference values corresponding to the coding target block according to the processing order which has been set, and transmitting/storing a resulting coded signal, together with the flag information.

16. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said method comprising:

performing rearrangement to an input signal that is obtained by coding various frequency components which have been subjected to a prediction process in a prescribed order, with switching, on the basis of flag information indicating whether adaptive rearrangement is carried out or not, which information is input together with the input signal, between the first rearrangement operation in which the input signal is subjected to adaptive rearrangement in an order according to the kind of the prediction process, and the second rearrangement operation in which the input signal is subjected to rearrangement in a specific order, regardless of the kind of the prediction process;

generating predicted values of frequency

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components corresponding to a decoding target block to be subjected to decoding from frequency components corresponding to an already decoded block located in the vicinity of the decoding target block, on the basis of the kind of the prediction process;

generating frequency components corresponding to the decoding target block on the basis of the input signal after the rearrangement and the predicted values; and

performing inverse frequency transformation to the frequency components corresponding to the decoding target block to regenerate an image signal corresponding to the decoding target block.

17. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

generating predicted values of an image signal of a coding target block to be subjected to coding from an image signal corresponding to an already coded display screen different from a display screen including the coding target block, by a prescribed prediction process;

transforming difference values between the image signal of the coding target block and the predicted values

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into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on a field basis;

setting a processing order for coding the frequency components of the coding target block, with switching, on the basis of flag information indicating whether adaptive order setting is carried out or not, between the first order setting operation in which a processing order is adaptively set according to the kind of the prediction process, and the second order setting operation in which a specific processing order is set regardless of the kind of the prediction process; and

successively coding the frequency components corresponding to the coding target block according to the processing order which has been set, and transmitting/storing a resulting coded signal, together with the flag information.

18. An image processing method for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation to a digital image signal, for each of blocks constituting a single display screen, said method comprising:

performing rearrangement to an input signal that

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is obtained by coding various frequency components which have been subjected to a prediction process in a prescribed order, with switching, on the basis of flag information indicating whether adaptive rearrangement is carried out or not, which information is input together with the input signal, between the first rearrangement operation in which the input signal is subjected to adaptive rearrangement in an order according to the kind of the prediction process, and the second rearrangement operation in which the input signal is subjected to rearrangement in a specific order, regardless of the kind of the prediction process;

performing inverse frequency transformation to the input signal after the rearrangement to generate a difference signal corresponding to a decoding target block to be subjected to decoding;

generating predicted values of an image signal of the decoding target block from an image signal corresponding to an already decoded display screen different from a display screen including the decoding target block, on the basis of the kind of the prediction process; and

regenerating an image signal corresponding to the decoding target block on the basis of the difference signal and the predicted values.

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19. An image processing apparatus for dividing an input digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said apparatus comprising:

a blocking unit for blocking the digital image signal correspondingly to the respective blocks, frame by frame or field by field, which is used as a processing unit of frequency transformation, and outputting the blocked image signal and frequency transformation type information indicating the processing unit of frequency transformation;

a frequency transformation unit for performing block-by-block frequency transformation to the blocked image signal to output frequency components corresponding to the image signal of each block;

a quantization unit for quantizing the frequency components to output quantized values corresponding to the image signal of each block;

plural scanners having different orders of rearrangement, and each setting a prescribed processing order to the quantized values by rearranging the quantized values;

a characteristic analyzing unit for performing characteristic analysis of the output of the quantization

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unit to output a scan specifying signal for specifying a scanner which performs rearrangement suitable for the quantized values of each block;

a memory for temporarily storing the scan specifying signals from the characteristic analyzing unit;

a scan control unit for outputting a control signal for selecting a scanner to be used for rearranging quantized values of a coding target block to be subjected to coding, according to the scan specification signals which are stored in the memory; and

a variable-length coding unit for performing variable-length coding to the quantized values after the rearrangement.

20. An image processing apparatus for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation on a frame basis or on a field basis to a digital image signal, for each of blocks constituting a single display screen, said apparatus comprising:

a variable-length decoding unit for performing variable-length decoding to a coded string that is obtained by performing rearrangement and variable-length coding to quantized values of frequency components of an image signal corresponding to each block;

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plural inverse scanners having different orders of rearrangement, and each rearranging quantized values which have been rearranged in coding so that the order of the quantized values is returned to the order before the rearrangement;

a characteristic analyzing unit for performing characteristic analysis of the output of the inverse scanner to output a scan specifying signal for specifying an inverse scanner which performs rearrangement suitable for the quantized values of each block;

a memory for temporarily storing the scan specifying signals from the characteristic analyzing unit;

an inverse scan control unit for outputting a control signal for selecting an inverse scanner to be used for rearranging quantized values of a decoding target block to be subjected to decoding, according to the scan specification signals which are stored in the memory;

an inverse quantization unit for inverse-quantizing the quantized values output from the selected inverse scanner to output frequency components of an image signal corresponding to each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the frequency components to output an image signal corresponding to each block; and

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an inverse blocking unit for inverse-blocking the image signals of the respective blocks according to frequency transformation type information indicating whether frequency transformation in coding is performed on a frame basis or on a field basis, to output a digital image signal.

21. An image processing apparatus for dividing an input digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said apparatus comprising:

a blocking unit for blocking the digital image signal correspondingly to the respective blocks, frame by frame or field by field, which is used as a processing unit of frequency transformation, and outputting the blocked image signal and frequency transformation type information indicating the processing unit of frequency transformation;

a frequency transformation unit for performing block-by-block frequency transformation to the blocked image signal to output frequency components corresponding to the image signal of each block;

a quantization unit for quantizing the frequency components to output quantized values corresponding to the

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image signal of each block;

a predictor for generating predicted values of quantized values corresponding to a coding target block to be subjected to coding, from quantized values corresponding to an already coded block located in the vicinity of the coding target block, and outputting the predicted values and prediction information concerning the kind of the generating process of the predicted values;

a first adder for subtracting the predicted values from the quantized values corresponding to the coding target block to output difference values;

a second adder for adding the predicted values to the difference values to output the result of the addition as quantized values corresponding to an already coded block;

plural scanners having different orders of rearrangement, and each being selected by a selecting signal and rearranging the difference values;

a scan control unit for outputting a first control signal for selecting a scanner to be used for rearranging the difference values, according to the prediction information;

a switch for selecting one of the first control signal and a second control signal for selecting a specific scan, according to a scan changing signal which is

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generated outside/inside a system, and outputting the selected control signal as the selecting signal of the scanner; and

a variable-length coding unit for performing variable-length coding to the difference values after the rearrangement.

22. An image processing apparatus for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation on a frame basis or on a field basis to a digital image signal, for each of blocks constituting a single display screen, said apparatus comprising:

a variable-length decoding unit for performing variable-length decoding to a coded string that is obtained by performing prediction, rearrangement, and variable-length coding to quantized values of frequency components of an image signal corresponding to each block;

plural inverse scanners having different orders of rearrangement, and each being selected by a selecting signal, and rearranging quantized values which have been rearranged in coding so that the order of the quantized values is returned to the order before the rearrangement;

an inverse scan control unit for outputting a first control signal for selecting an inverse scanner to be

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used for rearranging the quantized values, according to prediction information indicating the kind of prediction in coding;

a switch for selecting one of the first control signal and a second control signal for selecting a specific scan, according to a scan changing signal, and outputting the selected control signal as the selecting signal of the inverse scanner;

a predictor for generating predicted values of quantized values corresponding to a decoding target block to be subjected to decoding, from quantized values corresponding to an already decoded block located in the vicinity of the decoding target block, according to the prediction information;

an adder for adding the predicted values to the output of the inverse scanner;

an inverse quantization unit for inverse-quantizing the output of the adder to output frequency components of an image signal corresponding to each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the frequency components to output an image signal corresponding to each block; and

an inverse blocking unit for inverse-blocking the image signals of the respective blocks according to

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frequency transformation type information indicating whether frequency transformation in coding is performed on a frame basis or on a field basis, to output a digital image signal.

23. An image processing apparatus for dividing an input digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said apparatus comprising:

a blocking unit for blocking the digital image signal correspondingly to the respective blocks, frame by frame or field by field, which is used as a processing unit of frequency transformation, and outputting the blocked image signal and frequency transformation type information indicating the processing unit of frequency transformation;

a first adder for subtracting predicted values of the blocked image signal from the blocked image signal to output a difference signal;

a frequency transformation unit for performing block-by-block frequency transformation to the difference signal to output frequency components corresponding to the difference signal of each block;

a quantization unit for quantizing the frequency

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components to output quantized values corresponding to the image signal of each block;

an inverse quantization unit for inverse-quantizing the quantized values to output the frequency components corresponding to the difference signal of each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the output of the inverse quantization unit to output the difference signal of each block;

a second adder for adding the predicted values to the output of the inverse frequency transformation unit, and storing the result of the addition in a frame memory, as an image signal of an already coded block as a constituent of an already coded display screen;

a predictor for generating the predicted values on the basis of the image signal of each block and an image signal of an already coded block which is stored in the frame memory, and outputting the predicted values and prediction information concerning the generating process of the predicted values;

plural scanners having different orders of rearrangement, and each rearranging the quantized values;

a scan control unit for outputting a control signal for selecting a scanner to be used for rearranging

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the quantized values, according to a scan changing signal which is generated outside/inside a system and the prediction information; and

a variable-length coding unit for performing variable-length coding to the quantized values after the rearrangement.

24. An image processing apparatus for performing block-by-block decoding of a coded image signal that is obtained by performing a coding process including frequency transformation on a frame basis or on a field basis to a digital image signal, for each of blocks constituting a single display screen, said apparatus comprising:

a variable-length decoding unit for performing variable-length decoding to a coded string that is obtained by performing prediction, frequency transformation, quantization, rearrangement, and variable-length coding to an image signal corresponding to each block;

plural inverse scanners having different orders of rearrangement, and each rearranging quantized values which have been rearranged in coding so that the order of the quantized values is returned to the order before the rearrangement;

an inverse scan control unit for outputting a control signal for selecting an inverse scanner to be used

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for rearranging the quantized values, according to a scan changing signal and prediction information indicating the kind of prediction in coding;

an inverse quantization unit for inverse-quantizing the output of the inverse scanner to output frequency components of a difference signal corresponding to each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the frequency components to output a difference signal corresponding to each block;

an adder for adding predicted values of an image signal corresponding to each block to the difference signal to output an image signal corresponding to each block;

a frame memory for storing the output of the adder, as an image signal of an already decoded block as a constituent of an already decoded display screen;

a predictor for generating the predicted values on the basis of the prediction information and an image signal of an already coded block; and

an inverse blocking unit for inverse-blocking the image signals of the respective blocks according to frequency transformation type information indicating whether frequency transformation in coding is performed on a frame basis or on a field basis, to output a digital

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image signal.

25. An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, said method comprising:

generating inter-frame predicted values of an image signal of a coding target block to be subjected to coding, from an image signal corresponding to an already coded display screen different from a display screen including the coding target block, by a prescribed inter-frame prediction process;

transforming one of inter-frame difference values between the image signal of the coding target block and the inter-frame predicted values, and the image signal of the coding target block, into frequency components by one of frame-by-frame frequency transformation on a frame basis and field-by-field frequency transformation on a field basis;

generating intra-frame predicted values of the frequency components corresponding to the coding target block from frequency components corresponding to an already coded block located in the vicinity of the coding target block, by a prescribed intra-frame prediction process;

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setting a processing order for coding intra-frame difference values between the frequency components of the coding target block and the intra-frame predicted values, with switching, on the basis of flag information indicating switching of order setting, between the first order setting operation in which a processing order is adaptively set according to the kinds of both the prediction processes, and the second order setting operation in which a specific processing order is set regardless of the kinds of both the prediction processes; and

successively coding the intra-frame difference values corresponding to the coding target block according to the processing order which has been set, and transmitting/storing a resulting coded signal, together with the flag information.

26. The image processing method as defined in claim 25 wherein:

an interlaced image signal is received as the digital image signal;

in the first order setting operation,

concerning an inter-coded block in which the frequency components obtained by the frequency transformation correspond to the inter-frame difference values of the coding target block, the processing order

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prediction data corresponding to an already coded block located in the vicinity of the coding target block, outputting intra-frame difference values between the inter-frame prediction data and the intra-frame predicted values, and outputting intra-frame prediction information concerning the kind of the generating process of the intra-frame predicted values;

scanning means including plural scanners having different orders of rearrangement, and each being selected by a selecting signal and rearranging the intra-frame difference values, the scanning means selecting a scanner to be used for rearranging the intra-frame difference values, according to the inter-frame prediction information and a scan changing signal which is generated outside/inside a system; and

a variable-length coding unit for performing variable-length coding to the intra-frame difference values after the rearrangement; and

said scanning means being constructed so that switching is performed, on the basis of the scan changing signal, between the first order setting operation in which a coding order is adaptively set to the intra-frame difference values corresponding to the coding target block, according to the kinds of both the prediction processes, and the second order setting operation in which a specific

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coding order is set thereto, regardless of the kinds of both the prediction processes.

30. The image processing apparatus as defined in claim 29 wherein said inter-frame prediction means comprises:

a first adder for subtracting inter-frame predicted values of the blocked image signal from the blocked image signal to output a difference signal;

a frequency transformation unit for performing block-by-block frequency transformation to the difference signal to output frequency components corresponding to the difference signal of each block;

a quantization unit for quantizing the frequency components to output quantized values corresponding to the difference signal of each block as the inter-frame prediction data;

an inverse quantization unit for inverse-quantizing the quantized values to output the frequency components corresponding to the difference signal of each block;

an inverse frequency transformation unit for performing inverse frequency transformation to the output of the inverse quantization unit to output the difference signal of each block;

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a second adder for adding the inter-frame predicted values to the output of the inverse frequency transformation unit, and storing the result of the addition in a frame memory, as an image signal of an already coded block as a constituent of an already coded display screen; and

an inter-frame predictor for generating the inter-frame predicted values on the basis of the image signal of each block and an image signal of an already coded block which is stored in the frame memory, and outputting the inter-frame predicted values and inter-frame prediction information concerning the generating process of the inter-frame predicted values; and

said intra-frame prediction means comprises:

an intra-frame predictor for generating intra-frame predicted values of quantized values corresponding to a coding target block from quantized values corresponding to an already coded block located in the vicinity of the coding target block, and outputting the intra-frame predicted values and intra-frame prediction information concerning the kind of the generating process of the intra-frame predicted values;

a third adder for subtracting the intra-frame predicted values from the quantized values corresponding to the coding target block to output intra-frame difference

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~~claims 1 to 8, 13 to 18, 25 and 27.~~